Claims

1 A process for the production of precipitated calcium carbonate, as a source alternative to limestone, from calcium carbonate rich by-product generated in industrial processes, specifically from nitrophosphate fertilizer plant, which comprises:

(a) feeding continuously the wet calcium carbonate rich by-product containing up to 25% moisture and having particle size in the range of 20 to 150 microns, into a calciner maintained at above 850°C and below 950°C with an angle of inclination of about 1.08 degrees and the shell rotation speed in the range 0.5 to 2.0 RPM, at a feed rate of about 5 to 20 kg/h and provided with the arrangements to remove the liberated water vapors, carbon dioxide, ammonia and NO_x containing exhaust gas into a scrubber wherein ammonia and NO_x gases are scrubbed with water,

(b) passing the calciner outlet material coming out at 2.0 to 6.0 kg/h after residence time of 30 to 90 minutes in calciner to a crusher, crushing the calcined material using a suitable crusher (*e.g.*, Jaw crusher) to small lumps,

(c) cooling the small lumps to near ambient temperature (40 to 50°C) in a material cooler,

(d) slaking with water in a slaker provided with agitator rotating at 120 RPM to produce hydrated lime slurry having concentration 15 to 23% by weight, followed by

(e) removing heavier and coarser particles by sedimentation and/or wet sieving through 60 to 100 mesh sieve, diluting the slurry to desired concentration in the range of 10 to 20% by weight,

(f) taking 10-20% by weight slurry in a carbonation reactor and passing carbon dioxide – air mixture containing 25-75% by vol. Carbon dioxide at the superficial gas velocity of 10 to 15 cm/sec. and

maintaining the carbonation temperature in the range from 25 to 45°C until the pH of the slurry comes to near neutral which takes about 75 to 140 minutes,

(g) separating the precipitated material formed by known methods,

(h) drying and pulverizing the solid to get precipitated calcium carbonate having purity more than 97%, brightness of greater than 96%, average particle size of about 5 to 7 microns and 100% particles less than 20 microns, bulk density 0.40 to 0.45 g/ml and all other properties as mentioned in Table 1,

(i) optionally, treating the slurry before filtration with fatty acid derivative emulsion at 95°C in the amount 2.0 to 3.5% by weight of calcium carbonate to be produced, to get coated calcium carbonate followed by separation of the solid using known methods, drying and pulverizing the solid to get coated calcium carbonate. The process of the present invention leads to the overall pollution abatement of a nitrophosphate fertilizer plant by converting a solid waste to an industrially useful product.

(2) A process as claimed in claim 1 in step (a), wherein wet waste is charged into rotary calciner pre-heated to a temperature range of 850°C to 950°C to dry and remove accompanying impurities,

(3) A process as claimed in claim 1 in step (b), wherein the calcined material is sent to crusher for breaking big lumps,

(4) A process as claimed in claim 1 in step (c), wherein the lumps are cooled to 40° – 50°C.

(5) A process as claimed in claim 1 in step (d), wherein the outlet material from cooler is slaked in water to obtain slurry in the concentration range of 15 to 23% by weight with continuous agitation up to one hour at maximum 120 RPM to convert calcium oxide to calcium hydroxide.

(6) A process as claimed in claim 1 in step (f), wherein the said slaked lime slurry is subjected to carbonation, by passing there through sufficient quantity of a gas comprising 25% carbon dioxide in air to adjust the pH of the suspension to mere neutral, in a carbonation reactor provided with purger.

(7) A process as claimed in claim 1 in step (f), wherein the temperature of carbonation is preferably in the range of 30 to 45°C.

(8) A process as claimed in claim 1 in step (f), wherein said carbonation gas is admitted into the suspension of slaked lime to give space velocity in the range of 10 to 15 cm/sec.

(9) A process as claimed in claim 1 in step (g), wherein the precipitated product is separated preferably by filtration or centrifugation.

(10) A process as claimed in claim 1 in step (h), wherein the final product is dried and pulverised to get a product of purity 96%, brightness 97%, particle size is in the range of 5-20 microns and bulk density 0.40-0.65 g/ml.

(11) A process as claimed in claim 1 in step (i), wherein the slurry of the product is optionally treated with an emulsion of fatty acid derivative for coating to obtain a product having industrial application.

(12) A process as claimed in claim 1 is environmental friendly.